

10/073625

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Term: intrins\$2 same fluorescen\$2 same (biomolecule or protein\$1 or DNA or antibod\$3 or amino acid\$1) same metal\$3 particle\$1

Display: Documents in Display Format: Starting with Number

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Set Name	Query	Hit Count	Set Name
side by side result set			
DB=USPT,EPAB,JPAB,DWPI; PLUR=YES; OP=ADJ			
L11	L10 and suspen\$4	0	L11
L10	intrins\$2 same fluorescen\$2 same (biomolecule or protein\$1 or DNA or antibod\$3 or amino acid\$1) same metal\$3 particle\$1	2	L10
L9	intrins\$2 same fluorescen\$2 same (biomolecule or protein\$1 or DNA or antibod\$3 or amino acid\$1) same metal\$3 particle\$1	0	L9
L8	L7 and emissi\$2	4	L8
L7	L6 and suspen\$4	8	L7
L6	intrins\$2 same (biomolecule\$1 or protein\$1 or DNA or antibod\$3 or amino acid\$1) same fluorescen\$2 same metal\$3	20	L6
L5	L4 and (biomolecule\$1 or DNA or protein or amino acid\$1)	13	L5
L4	L3 and emissi\$2	17	L4
L3	L2 and suspen\$4	25	L3
L2	intrins\$2 same fluorescen\$2 same metal	66	L2
L1	instris\$2 same fluorescen\$2 same metal	0	L1

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```
=> s intrins2 (P)fluorescen2 (P) (biomolecule or protein## or DNA or antibod### or
amino acid#) (P)matal###
2 IS NOT A RECOGNIZED COMMAND
The previous command name entered was not recognized by the system.
For a list of commands available to you in the current file, enter
"HELP COMMANDS" at an arrow prompt (=>).
```

```
=> s intrins## (P)fluorescen## (P) (biomolecule or protein## or DNA or antibod###
or amino acid#) (P)matal###
2 FILES SEARCHED...
L1      0 INTRINS## (P) FLUORESCEN## (P) (BIOMOLECULE OR PROTEIN## OR DNA
        OR ANTIBOD### OR AMINO ACID#) (P) MATAL###
```

```
=> s intrins## (P)fluorescen## (P) (biomolecule or protein## or DNA or antibod###
or amino acid#) (P)metal###
2 FILES SEARCHED...
L2      481 INTRINS## (P) FLUORESCEN## (P) (BIOMOLECULE OR PROTEIN## OR DNA
        OR ANTIBOD### OR AMINO ACID#) (P) METAL###
```

```
=> s l2 and suspen####
L3      0 L2 AND SUSPEN####
```

```
=> s l2 and (metal###(10a)particle#)
L4      13 L2 AND (METAL###(10A) PARTICLE#)
```

```
=> s l4 and suspen####
L5      0 L4 AND SUSPEN####
```

```
=> dup rem l4
PROCESSING COMPLETED FOR L4
L6      4 DUP REM L4 (9 DUPLICATES REMOVED)
```

```
=> s l6 and suspen####
L7      0 L6 AND SUSPEN####
```

```
=> d l6 1-4 bib ab kwic
```

```
L6      ANSWER 1 OF 4  CAPLUS  COPYRIGHT 2004 ACS on STN
AN      2002:671304  CAPLUS
DN      138:350624
TI      Biomedical applications of radiative decay engineering
AU      Lakowicz, Joseph R.; Gryczynski, Ignacy; Malicka, Joanna; Shen, Yibing;
        Gryczynski, Zygmunt
CS      Center for Fluorescence Spectroscopy, Dep. Biochem. and Molecular Biology,
        Univ. of Maryland/Baltimore, Baltimore, MD, 21201, USA
SO      Proceedings of SPIE-The International Society for Optical Engineering
        (2002), 4626(Biomedical Nanotechnology Architectures and Applications),
        473-485
        CODEN: PSISDG; ISSN: 0277-786X
PB      SPIE-The International Society for Optical Engineering
DT      Journal
LA      English
AB      Fluorescence spectroscopy is a widely used research tool in
        biochem. and has also become the dominant method enabling the revolution
        in medical diagnostics, DNA sequencing and genomics. In this
        forward-looking article we describe a new opportunity in
        fluorescence, radiative decay engineering (RDE). By RDE we mean
        modifying the emission of fluorophores or chromophores by a nearby
        metallic surface, the most important effect being an increase in
        the radiative decay rate. We describe the usual effects expected form
        increase in the radiative rates with reference to the biomedical applications
        of immunoassay and DNA hybridization. We also present expts.
        which show that metallic particles can increase the
        quantum yield of low quantum yield fluorophores, increase fluorophore
```

photostability and increase the distance for resonance energy transfer. And finally we show that proximity to silver particles can increase the intensity of the **intrinsic fluorescence** from **DNA**.

RE.CNT 48 THERE ARE 48 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

AB **Fluorescence** spectroscopy is a widely used research tool in biochem. and has also become the dominant method enabling the revolution in medical diagnostics, **DNA** sequencing and genomics. In this forward-looking article we describe a new opportunity in **fluorescence**, radiative decay engineering (RDE). By RDE we mean modifying the emission of fluorophores or chromophores by a nearby **metallic** surface, the most important effect being an increase in the radiative decay rate. We describe the usual effects expected form increase in the radiative rates with reference to the biomedical applications of immunoassay and **DNA** hybridization. We also present expts. which show that **metallic particles** can increase the quantum yield of low quantum yield fluorophores, increase fluorophore photostability and increase the distance for resonance energy transfer. And finally we show that proximity to silver particles can increase the intensity of the **intrinsic fluorescence** from **DNA**.

IT **Particles**
 (**metallic**; biomedical applications of radiative decay engineering)

L6 ANSWER 2 OF 4 MEDLINE on STN DUPLICATE 1

AN 2002147321 MEDLINE

DN PubMed ID: 11814297

TI Radiative decay engineering. 2. Effects of Silver Island films on fluorescence intensity, lifetimes, and resonance energy transfer.

AU Lakowicz Joseph R; Shen Yibing; D'Auria Sabato; Malicka Joanna; Fang Jiyu; Gryczynski Zygmunt; Gryczynski Ignacy

CS Center for Fluorescence Spectroscopy, Department of Biochemistry and Molecular Biology, University of Maryland Baltimore, 725 West Lombard Street, Baltimore, Maryland 21201, USA.

NC RR-08119 (NCRR)

SO Analytical biochemistry, (2002 Feb 15) 301 (2) 261-77.
Journal code: 0370535. ISSN: 0003-2697.

CY United States

DT Journal; Article; (JOURNAL ARTICLE)

LA English

FS Priority Journals

EM 200204

ED Entered STN: 20020308

Last Updated on STN: 20020429

Entered Medline: 20020426

AB **Metallic** surfaces can have unusual effects on fluorophores such as increasing or decreasing the rates of radiative decay and the rates of resonance energy transfer (RET). In the present article we describe the effects of **metallic** silver island films on the emission spectra, lifetimes, and energy transfer for several fluorophores. The fluorophores are not covalently coupled to the silver islands so that there are a range of fluorophore-to-**metal** distances. We show that proximity of fluorophores to the silver islands results in increased **fluorescence** intensity, with the largest enhancement for the lowest-quantum-yield fluorophores. Importantly, the **metal** -induced increases in intensity are accompanied by decreased lifetimes and increased photostability. These effects demonstrate that the silver islands have increased the radiative decay rates of the fluorophore. For solvent-sensitive fluorophores the emission spectra shifted to shorted wavelengths in the presence of the silver islands, which is consistent with a decrease of the apparent lifetime for fluorophores near the **metal** islands. We also observed an increased intensity and blue

spectral shift for the **protein** human glyoxalase, which displays a low quantum yield for its **intrinsic** tryptophan emission. In this case the blue shift is thought to be due to increased emission from a buried low-quantum-yield tryptophan residue. Increased intensities were also observed for the **intrinsic** emission of the nucleic acid bases adenine and thymine and for single-stranded 15-mers poly(T) and poly(C). And finally, we observed increased RET for donors and acceptors in solution and when bound to double-helical **DNA**. These results demonstrate that **metallic particles** can be used to modify the emission from **intrinsic** and extrinsic fluorophores in biochemical systems.

2002 Elsevier Science (USA).

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2002 Elsevier Science (USA).

L6 ANSWER 3 OF 4 MEDLINE on STN DUPLICATE 2
AN 2001485445 MEDLINE
DN PubMed ID: 11527380
TI **Intrinsic fluorescence from DNA can be enhanced by metallic particles.**
AU Lakowicz J R; Shen B; Gryczynski Z; D'Auria S; Gryczynski I
CS Center for Fluorescence Spectroscopy, Department of Biochemistry and Molecular Biology, University of Maryland School of Medicine, 725 West Lombard Street, Baltimore, Maryland 21201, USA.
NC RR-08119 (NCRR)
SO Biochemical and biophysical research communications, (2001 Sep 7) 286 (5) 875-9.
Journal code: 0372516. ISSN: 0006-291X.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 200110
ED Entered STN: 20010903
Last Updated on STN: 20011015
Entered Medline: 20011011
AB High sensitivity detection of **DNA** is essential for genomics. The **intrinsic fluorescence** from **DNA** is very weak and almost all methods for detecting **DNA** rely on the use of

extrinsic fluorescent probes. We show that the intrinsic emission from DNA can be enhanced many-fold by spatial proximity to silver island films. Silver islands are subwavelength size patches of metallic silver on an inert substrate. Time-resolved measurements show a decreased lifetime for the intrinsic DNA emission near the silver islands. These results of increased intensity and decreased lifetime indicate a metal-induced increase in the radiative rate decay of the DNA bases. The possibility of increased radiative decay rates for DNA bases and other fluorophores suggest a wide variety of DNA measurements and other biomedical assays based on metal-induced increases in the fluorescence quantum yield of weakly fluorescent substances.

Copyright 2001 Academic Press.

TI Intrinsic fluorescence from DNA can be enhanced by metallic particles.

AB High sensitivity detection of DNA is essential for genomics. The intrinsic fluorescence from DNA is very weak and almost all methods for detecting DNA rely on the use of extrinsic fluorescent probes. We show that the intrinsic emission from DNA can be enhanced many-fold by spatial proximity to silver island films. Silver islands are subwavelength size patches of metallic silver on an inert substrate. Time-resolved measurements show a decreased lifetime for the intrinsic DNA emission near the silver islands. These results of increased intensity and decreased lifetime indicate a metal-induced increase in the radiative rate decay of the DNA bases. The possibility of increased radiative decay rates for DNA bases and other fluorophores suggest a wide variety of DNA measurements and other biomedical assays based on metal-induced increases in the fluorescence quantum yield of weakly fluorescent substances.

Copyright 2001 Academic Press.

L6 ANSWER 4 OF 4 MEDLINE on STN

DUPLICATE 3

AN 2001568058 MEDLINE

DN PubMed ID: 11673890

TI Radiative decay engineering: biophysical and biomedical applications.

AU Lakowicz J R

CS Center for Fluorescence Spectroscopy, Department of Biochemistry and Molecular Biology, University of Maryland at Baltimore, 725 W. Lombard Street, Baltimore, Maryland 21201, USA.

NC RR-01889 (NCRR)

SO Analytical biochemistry, (2001 Nov 1) 298 (1) 1-24. Ref: 120
Journal code: 0370535. ISSN: 0003-2697.

CY United States

DT Journal; Article; (JOURNAL ARTICLE)

General Review; (REVIEW)
(REVIEW, TUTORIAL)

LA English

FS Priority Journals

EM 200202

ED Entered STN: 20011025

Last Updated on STN: 20020215

Entered Medline: 20020214

AB Fluorescence spectroscopy is a widely used research tool in biochemistry and molecular biology. Fluorescence has also become the dominant method enabling the revolution in medical diagnostics, DNA sequencing, and genomics. To date all the fluorescence observables, including spectral shifts, anisotropies, quantum yields, and lifetimes, have all been utilized in basic and applied uses of fluorescence. In this forward-looking article we describe a new opportunity in fluorescence, radiative decay engineering (RDE). By RDE we mean modifying the emission of fluorophores

or chromophores by increasing or decreasing their radiative decay rates. In most **fluorescence** experiments the radiative rates are not changed because these rates depend on the extinction coefficient of the fluorophore. This **intrinsic** rate is not changed by quenching and is only weakly dependent on environmental effects. Spectral changes are usually caused by changes in the nonradiative rates resulting from quenching or resonance energy transfer. These processes affect the emission by providing additional routes for decay of the excited states without emission. In contrast to the relatively constant radiative rates in free solution, it is known that the radiative rates can be modified by placing the fluorophores at suitable distances from **metallic** surfaces and **particles**. This Review summarizes results from the physics literature which demonstrate the effects of **metallic** surfaces, colloids, or islands on increasing or decreasing emissive rates, increasing the quantum yields of low quantum yield chromophores, decreasing the lifetimes, and directing the typically isotropic emission in specific directions. These effects are not due to reflection of the emitted photons, but rather as the result of the fluorophore dipole interacting with free electrons in the **metal**. These interactions change the intensity and temporal and spatial distribution of the radiation. We describe the unusual effects expected from increases in the radiative rates with reference to **intrinsic** and extrinsic biochemical fluorophores. For instance, the decreased lifetime can result in an effective increase in photostability. Proximity to nearby **metallic** surfaces can also increase the local field and modify the rate of excitation. We predict that the appropriate localization of fluorophores near particles can result in usefully high emission from "nonfluorescent" molecules and million-fold increases in the number of photons observable from each fluorophore. We also describe how RDE can be applied to medical testing and biotechnology. As one example we predict that nearby **metal** surfaces can be used to increase the low **intrinsic** quantum yields of nucleic acids and make unlabeled DNA detectable using its **intrinsic metal**-enhanced **fluorescence**.

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AB **Fluorescence** spectroscopy is a widely used research tool in biochemistry and molecular biology. **Fluorescence** has also become the dominant method enabling the revolution in medical diagnostics, DNA sequencing, and genomics. To date all the **fluorescence** observables, including spectral shifts, anisotropies, quantum yields, and lifetimes, have all been utilized in basic and applied uses of **fluorescence**. In this forward-looking article we describe a new opportunity in **fluorescence**, radiative decay engineering (RDE). By RDE we mean modifying the emission of fluorophores or chromophores by increasing or decreasing their radiative decay rates. In most **fluorescence** experiments the radiative rates are not changed because these rates depend on the extinction coefficient of the fluorophore. This **intrinsic** rate is not changed by quenching and is only weakly dependent on environmental effects. Spectral changes are usually caused by. . . free solution, it is known that the radiative rates can be modified by placing the fluorophores at suitable distances from **metallic** surfaces and **particles**. This Review summarizes results from the physics literature which demonstrate the effects of **metallic** surfaces, colloids, or islands on increasing or decreasing emissive rates, increasing the quantum yields of low quantum yield chromophores, decreasing. . . reflection of the emitted photons, but rather as the result of the fluorophore dipole interacting with free electrons in the **metal**. These interactions change the intensity and temporal and spatial distribution of the radiation. We describe the unusual effects expected from increases in the radiative rates with reference to **intrinsic** and extrinsic biochemical fluorophores. For instance, the decreased lifetime can result in an effective increase in photostability. Proximity to nearby **metallic** surfaces can also increase the local field and modify the

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biotechnology. As one example we predict that nearby **metal**
surfaces can be used to increase the low **intrinsic** quantum
yields of nucleic acids and make unlabeled **DNA** detectable using
its **intrinsic metal-enhanced fluorescence**.
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